A. Final report for JPL-**NASA QuikSCAT Project (Period 6/27/2000-4/30/2005)**

About 20% of global rainfall is produced in the Amazon, and but its influences on climate over the Atlantic and adjacent continents are is still virtually unknown. In our previous OVSWT project, we have used multi-year QuikSCAT ocean surface winds to systematically investigate the influences of South American rainfall on ocean surface winds and SSTs over the Atlantic ranging fromwithin the range of synoptic to interannual scales. The main results are summarized as the followsing:

3i) *Detecting the influence of Amazonian rainfall on North Atlantic Oscillation (NAO):* NAO dominates the climate variabilityies over the North Atlantic, Eastern North America and Europe (ref). Using the QuikSCAT daily ocean surface winds, and TRMM daily precipitation data,, and numerical model simulations, we have demonstrated this influence carried outgenerated byfrom the latitudinal propagation of Rossby waves generated by Amazon convection. Our observations also suggests that an increase of Amazonian rainfall can generate anomalous atmospheric circulation patterns that tend to amplify the pre-existing winter NAO patterns. and so Through such influences, the strong interannual changes of Amazonian rainfall could contribute to the changes of winter wind patterns in the eastern United States and Western and Southern Europee. This work is under revision for the Proceedings of of the National Academy of Sciences (Fu et al., 2005a).

4ii) *Observing the iInfluence of Amazonian rainfall on Atlantic ITCZ through convective coupled Kelvin waves:* Climate variability in the tropical Atlantic is strongest and most uncertain during boreal spring. The cause of such strong variability is still unclear. Usinge QuikSCAT ocean surface winds data, we have found shown us that the variability of the ITCZ during boreal spring is dominated by an east-west oscillation of anomalous surface wind convergence/divergence and rainfall. Such oscillation is induced by convective coupled Kelvin waves generated in the western Amazon. This implies that the climate variability of Amazonian rainfall could contribute to the climate variability of the Atlantic ITCZ in boreal spring. This work has been submitted to J. Climate (Wang and Fu, 2005).

5iii) *Detecting the iInfluence of Amazon rainfall on ocean surface winds and SSTs in the tropical western Atlantic:* By joint Uutilizingse of QuikSCAT, TRMM, reanalysis and, ocean mixed layer model, we have shown that the interannual change of Amazonian rainfall could lead to 0.5° - 1°C interannual SST anomalies in the western tropical Atlantic, comparable to those induced by ENSO or NAO. (Fu et al. 2005b). The manuscript is in preparation for publication in J. Climate.

6iv) *Predicting strong South American low-level jets (SALLJs) using QuikSCAT ocean surface winds:* SALLJs transport moisture from the Amazon to the La Plata river basin, which produces most of the agriculture product in South American and 70% of gGross nNet pProduction of five South American countries, including Brazil and Argentina. We have identified the mechanisms that control the seasonal and intraseasonal variations of SALLJs (Wang and Fu, 2004). Based on this mechanism, we have developed a statistical model which enables us to predict up to 60% of the

strongest SALLJ events 2-5 days in advance using the QuikSCAT daily ocean surface wind. This work has been reported at the 4th CLIVAR Variability of American Monsoon Systems (VAMOS) panel meeting and has been submitted to GRL (Wang et al., 2005).

We have presented these results at five5 SeaWinds OVWST science team meetings during the period of 2001-2005, and 11 other national and international conferences, including invited presentations at the US CLIVAR VAMOS 4th panel meeting and the, AMS air-sea interaction conference in 2004. We haveThe PI convened special sessions in the AGU Fall conferences and III 3rd LBA International Conferences., and The PI has also contributed to the white papers "Scientific Opportunities Provided by SeaWinds in Tandem" and "Synergism of SeaWinds and AMSR", a proposal to NASA for combined microwave scatterometer and radiometer measurements on the Global Change Observation Mission-W of the Japan Aerospace Exploration Agency.

In this previous OVWST project, the daily and twice daily observations of ocean surface winds provided by QuikSCAT and SeaWinds have enabled us to clarify identify the atmospheric dynamic processes behind the influences of continental rainfall on ocean surface winds, ITCZ and SSTs, hences. These works have, for the first time, provided an observational clarifyfication on the debate about this issues raised by the discrepancies among numerical experimental results (e.g., Biasutti et al., 2003;, Ruiz-Barradas et al., 2003). However, the potential impact of these processes on climate variabilities variability could not be adequately examined due to the short duration of the QuikSCAT data. In fact, our pPublications has been delayedd to wait until the last year of the project in order to get obtain enough samples to pass a statistical significance test. During the period of this OVWST NRA, provided approval of ourif our proposal is approved, we will be able to directly examine the interannual variability over the Atlantic-South American region as QuikSCAT approaches its sixth year of service with excellent observations.